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The effect of climate change on viticulture in the Western Cape of South Africa

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There are many studies on global climate change, however, there is limited information on regional climate change and its effect on South Africa. This limits abilities to develop effective mitigation and adaptation strategies. It was projected that in the case of a global average temperature increase of 2 °C under optimistic conditions, South Africa was identified as one of the most vulnerable countries, and it was predicted that it will experience approximately 4 °C increase along the coast, and 7 °C in the interior by 2100.

The majority of viticulture is practiced in the Western Cape within South Africa, where the Mediterranean climate conditions resemble to the European Mediterranean regions (except the hemispherical differences). This area receives more rain than the inland regions, which makes it optimal for grape production. However, this region recently experienced an 18-month-long drought that threatened water resources and greatly affected agriculture.

For the present study, historic and future scenario simulation data were downloaded from the ESGF server of the CORDEX program, 10 and 9 simulations are available with 0.22° horizontal resolution for the RCP 8.5 and RCP 2.6, respectively. The reference period for this study is the 1981-2000 period, in addition, three different scenario periods are analysed: the near future (2021-2040), the mid-century (2041-2060), and the end of the century (2079-2098). Climate change maps project an increase (>100%) in precipitation at the end of the century under the pessimistic conditions, and an increase of 3 °C in the Western Cape region. However, some of the model simulations project these increases.

Such an increase in temperature will result in prolonged droughts and more frequent heat waves, thus resulting in alterations of ecosystem structures. Increased precipitation variability poses uncertainties for vine farmers, approximately 10,000 hectares of grapevine area has been lost in the past decade and more area could be lost due to climate change. The future of viticulture depends on the application of efficient mitigation and adaptation strategies against the fast changing climate.